

Auto Switch Guide

Reed Switches/Solid State Switches

For Air Grippers (Rotary Actuators)

Applicable Auto Switch

Type	Auto switch mounting	Electrical entry	Auto switch model	Applicable rotary actuators										Applicable air grippers										Page
				Size										Size										
				CDRA1 30	CDRB 50-100	CDRQ2 10/15 20-100	MRQ 10/15 20-40	MDSUB 32/40	MSQ 1/3 7/20 10-200	MH22 10-25	MH2J2 10-25	MHL2 10-40	MDHR 10-30	MHK 12-25	MHS 16-25	MHS 32-125	MHC2 10-25	MHT2 32-63	MHW2 20-50	MHY 10-25	MRHQ 10-25			
Reed switch	Rail	Grommet	D-A72/A73/A80	●														●				12-13-7		
			D-A72H/A73H D-A76H/A80H	●															●				12-13-8	
		Connector	D-A73C/A80C	●															●				12-13-9	
		Grommet	D-A53/A54/A56 D-A64/A67		●																		—	
	Direct	Grommet	D-90/97			●				●													—	
			D-A90/A93/A96 D-A90V/A93V/A96V					●	●			●							●				12-13-10	
			D-90A/93A			●					●												—	
			D-R731/R732				●					●											—	
			D-R801/R802				●					●											—	
		Connector	D-R731C/R732C D-R801C/R802C				●				●												—	
Rail	Grommet	D-A79W	●														●				12-13-11			
Tie-rod	Grommet	D-A59W		●																	—			
Solid state switch	Rail	Grommet	D-F79/F7P/J79	●														●				12-13-12		
			D-F7NV/F7PV/F7BV	●															●				12-13-13	
		Connector	D-J79C	●															●				12-13-14	
		Grommet	D-F59/F5P/J51/J59		●																	—		
	Direct	Grommet	D-S991/S992/S99V1/S99V2			●					●												—	
			D-T991/T992/T99V1/T99V2			●						●											—	
			D-S9P1/S9P2/S9PV1/S9PV2			●						●											—	
			D-S791/S792				●						●										—	
			D-T791/T792				●						●										—	
			D-S7P1/S7P2				●						●										—	
		Connector	D-T791C/T792C				●						●									—		
		Grommet	D-F8N/F8P/F8B									●	●									12-13-15		
	Grommet	D-M9N/M9P/M9B D-M9NV/M9PV/M9BV				●	●				●	●	●		●	●		●		●	●	12-13-16		
		D-Y59A/Y7P/Y59B D-Y69A/Y7PV/Y69B										●		●			●	●		●		12-13-17		
		Rail	Grommet	D-F79W/F7PW/J79W	●														●				12-13-18	
	Direct	Grommet	D-Y7NW/Y7PW/Y7BW D-Y7NWW/Y7PWW/Y7BWW									●		●				●		●		12-13-19		
			D-F9NW/F9PW/F9BW D-F9NWW/F9PWW/F9BWW									●	●	●					●		●		12-13-20	
			Tie-rod	Grommet	D-F59W/F5PW/J59W		●																—	
	Rail	Grommet	D-F79F																●				12-13-21	
			D-F59F		●																		—	
Rail	Grommet	D-F7BAL/F7BAVL																●				12-13-22		
Tie-rod		D-F5BAL		●																	—			
Direct		D-Y7BAL																				12-13-24		
		D-F9BAL				●	●					●				●	●		●			12-13-23		
Rail	Grommet	D-F7NTL																			—			
Tie-rod		D-F5NTL		●																	—			

Note) As for the applicable auto switches on Rotary Actuators, refer to pages in Best Pneumatics Vol. 11.



Auto Switches Precautions 1

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Design and Selection

⚠ Warning

1. Check the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications of current, voltage, temperature or impact.

2. Use caution when multiple cylinders are used and close to each other.

When two or more auto switch cylinders are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40 mm. (When the allowable interval is specified for each cylinder series, use the indicated value.)

3. Use caution to the ON time of a switch at the intermediate position of stroke.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate, but if the speed is too great, the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V \text{ (mm/s)} = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}} \times 1000$$

In cases of high piston speed, the use of an auto switch (D-F5NT/F7NT/G5NT and M5□T) with a built-in OFF delay timer (≈ 200 ms) makes it possible to extend the load operating time.

4. Wiring should be kept as short as possible.

<Reed switches>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)

- 1) For an auto switch without a contact protection circuit, use a contact protection box when the wire length is 5 m or longer.
- 2) Even if an auto switch has a built-in contact protection circuit, when the wiring is more than 30 m long, it is not able to adequately absorb the rush current and its life may be reduced. It is again necessary to connect a contact protection box in order to extend its life. Please contact SMC in this case.

<Solid state switches>

- 3) Although wire length should not affect switch function, use a wire 100 m or shorter.

5. Use caution to the internal voltage drop of a switch.

<Reed switches>

- 1) Switches with an indicator light (Except D-A56/A76H/A96/A96V/C76/E76A/Z76)
- If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)
[The voltage drop will be "n" times larger when "n" auto switches are connected.]
Even though an auto switch operates normally, the load may not operate.



- Similarly, when operating below a specified voltage, it is possible that the load may be ineffective even though the auto switch function is normal. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

- 2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator for right (MODEL D-A6□/A80/A80H/A90/A90V/C80/R80/90/E80A/Z80)

<Solid state switches>

- 3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).

Also note that a 12 VDC relay is not applicable.

6. Use caution to the leakage current.

<Solid state switches>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

Current to operate load (OFF condition) > Leakage current

If the condition given in the above formula is not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification cannot be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel.

7. Do not use a load that generates surge voltage.

<Reed switches>

If driving a load such as a relay that generates a surge voltage, use a switch with a built-in contact protection circuit or use a contact protection box.

<Solid state switches>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

8. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch.

Also perform periodic maintenance inspections and confirm proper operation.

9. Ensure sufficient space for maintenance activities.

When designing an application, be sure to allow sufficient space for maintenance and inspection.



Auto Switches Precautions 2

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Mounting and Adjustment

Warning

1. Do not drop or bump.

Do not drop, bump, or apply excessive impacts (300 m/s² or more for reed switches and 1000 m/s² or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

2. Do not carry a cylinder by the auto switch lead wires.

Never carry a cylinder by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

3. Mount switches using the proper tightening torque.

When a switch is tightened beyond the range of fastening torque, the mounting screws or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position. (Refer to switch mounting for each series regarding switch mounting, moving, and fastening torque, etc.)

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting positions shown in the catalog indicate the optimum position at the stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), the operation will be unstable.

Wiring

Warning

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from repeatedly applying bending stress or stretching force to the lead wires.

2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned on when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.

3. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

4. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits including auto switches may malfunction due to noise from these other lines.

5. Do not allow short circuiting of loads.

<Reed switches>

If the power is turned on with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switches>

Model D-F9□(Y)/F9□W(V)/J51/G5NB and all models of PNP output switches do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged.

Use caution to avoid reverse wiring with the brown [red] power supply line and the black [white] output line on 3-wire type switches.

6. Avoid incorrect wiring.

<Reed switches>

A 24 VDC switch with indicator light has polarity. The brown lead wire or terminal no. 1 is (+), and the blue lead wire or terminal no. 2 is (–).

[In the case of model D-97, the side without indicator is (+), and the black line side is (–).]

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.

Also note that a current greater than the maximum specified one will damage a light emitting diode and make it inoperable.

Applicable models:

D-A73/A73H/A73C/C73/C73C/E73A/Z73/R73

D-97/93A/A93/A93V

D-A33/A34/A33A/A34A/A44/A44A

D-A53/A54/B53/B54

2) However, when using a two color indication auto switch, the switch (D-A79W/A59W/B59W), be aware that the switch will constantly remain ON if the connections are reversed.

<Solid state switches>

1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.

2) If connections are reversed (power supply line (+) and power supply line (–) on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue (black) wire and the power supply line (–) is connected to the black (white) wire, the switch will be damaged.

* Lead wire color changes

Lead wire colors of SMC auto switches have been changed in order to meet NECA Standard 0402 for production beginning September, 1996 and thereafter. Please refer to the tables provided.

2-wire

	Old	New
Output (+)	Red	Brown
Output (–)	Black	Blue

Solid State with Diagnostic Output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Diagnostic output	Yellow	Orange

3-wire

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black

Solid State with Latch Type Diagnostic Output

	Old	New
Power supply (+)	Red	Brown
Power supply GND	Black	Blue
Output	White	Black
Latch type diagnostic output	Yellow	Orange

MHZ

MHF

MHL

MHR

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

D-

20-



Auto Switches Precautions 3

Be sure to read before handling.

For detailed precautions on every series, refer to main text.

Operating Environment

Warning

1. Never use in the presence of explosive gases.

The construction of our auto switches does not make them explosion-proof. Never use them in the presence of an explosive gas, as this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside cylinders will become demagnetized. (Please consult with SMC regarding the availability of a magnetic field resistant auto switch.)

3. Do not use in environments where the auto switches will be constantly exposed to water.

Although switches except D-A3□/A44□/G39□/K39 satisfy the IEC standard IP67 structure (JIS C 0920: anti-immersion structure), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in environments with oil or chemicals.

Please consult with SMC if auto switches will be used in an environment with coolants, cleaning solvents, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, a malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Please consult with SMC if switches are to be used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

6. Do not use in environments where there is excessive impact shock.

<Reed switches>

When excessive impact (300 m/s² or more) is applied to a reed switch during operation, the contact point may malfunction and generate or cut off a signal momentarily (1 ms or less). Please consult with SMC regarding the need to use a solid state switch depending on the environment.

7. Do not use in locations where surges are generated.

<Solid state switches>

When there are units (solenoid type lifters, high frequency induction furnaces, motors, etc.) which generate a large amount of surge in the area around cylinders with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.

8. Avoid accumulation of iron debris or close contact with magnetic substances.

When a large amount of ferrous debris such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with an auto switch cylinder, it may cause the auto switches to malfunction due to a loss of the magnetic force inside the cylinder.

Maintenance

Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

1) Securely tighten switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten screws securely after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace switches or repair lead wires if damage is discovered.

3) Confirm that the green light on the 2-color indicator type switch lights up.

Confirm that the Green LED is ON when stopped at the set position. If the Red LED is ON when stopped at the set position, the mounting position is not appropriate. Readjust the mounting position until the Green LED lights up.

Other

Warning

1. Please consult with SMC concerning water resistance, elasticity of lead wires, and use at welding sites.

Before Operation

Auto Switches Common Specifications

⚠ Precautions

Refer to "Auto Switches Precautions" on pages 12-13-2 to 12-13-4 before handling.

Auto Switches Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100 μ A or less, 2-wire: 0.8 mA or less ⁽⁴⁾
Operating time	1.2 ms	1 ms or less ⁽³⁾
Impact resistance	300 m/s ²	1000 m/s ²
Insulation resistance	50 M Ω or more at 500 M VDC (Between lead wire and case)	
Withstand voltage	1500 VAC for 1 minute ⁽¹⁾ (Between lead wire and case)	1000 VAC for 1 minute (Between lead wire and case)
Ambient temperature	-10 to 60°C	
Enclosure	IEC529 Standard IP67, Immersible construction (JIS C 0920) ⁽²⁾	

Note 1) Electrical entry: Connector type (A73C/A80C/C73C/C80C) and D-9/9□A/A9/A9□V type: 1000 VAC/min. (Between lead wire and the case)

Note 2) The following switches, Terminal conduit type (D-A3/A3□A/A3□C/G39/G39A/G39C/K39/K39A/K39C), DIN terminal type (D-A44/A44A/A44C) and Heat resistant auto switch (D-F7NJL) meet the IEC529 standard.

Note 3) IP63, JIS C 0920 Rainproof construction
Except solid state switch with timer (D-M5□TL, G5NTL/F7NTL/F5NTL) and magnetic resistant 2-color indication type solid state switch (D-P5DWL). D-J51: 5 ms or less

Note 4) Except D-J51 (1 mA or less at 100 VAC, 1.5 mA or less at 200 VAC), D-M5NW/M5PW/M5BW, D-F9BAL, D-P5DWL (1 mA or less at 24 VDC).

Lead Wire Length

Lead wire length indication

(Example) **D-A73L**

Lead wire length

Nil	0.5 m	Z	5 m
L	3 m	N*	None

* Applicable for the connector type (D-□□C) only.

(Example) **D-F8PL-61**

Flexible lead wire specifications

(D-Y59, D-Y69, D-Y7 and D-M9□/M9□V series use flexible lead wire as standard.)

Part No. of Lead Wires with Connectors

(Applicable only for connector type)

Model	Lead wire length
D-LC05	0.5 m
D-LC30	3 m
D-LC50	5 m

Note 1) Applicable auto switch with 5 m lead wire ("Z")

Reed switch: D-B53/B54, D-C73(C)/C80C, D-A73(C)(H)/A80C, D-A53/A54, D-Z73, D-90/97/90A/93A

Solid state switch: Manufactured upon receipt of order as standard.

Note 2) The standard lead wire length of solid state switches with timer, water resistant 2-color indication type, wide range detection type or heat resistant 2-color indication type is 3 meters in length. (0.5 m is not available.)

Note 3) Lead wire lengths of 3 m and 5 m are standard for magnetic field resistant 2-color indicator type solid state switches. (0.5 m is not available.)

Note 4) Add "-61" at the end of the part number for the flexible lead wire except D-Y59, D-Y69, D-Y7 and D-M9□/M9□V type auto switches.

Contact Protection Box: CD-P11, CD-P12

1

<Applicable switch types>

D-A7/A8, D-A7□H/A80H, D-A73C/A80C, D-C7/C8, D-C73C/C080C, D-E7□A/E80A, D-Z7/Z8, D-9/9□A, D-A9/A9□V, and D-A79W type

The above auto switches do not have internal contact protection circuits.

1. Operating load is an inductive load.
2. The length of wiring to the load is 5 m or more.
3. The load voltage is 100 or 200 VAC.

A contact protection box should be used in any of the above conditions. Unless using a contact protection box, the contact life may be shortened. (Due to permanent energizing conditions.)

D-A72(H) must be used with the contact protection box regardless of load styles and lead wire length.

2

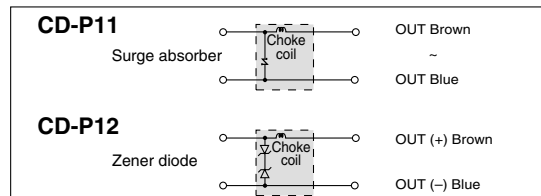
Please contact SMC when using built-in contact protection circuit style (D-A34[A][C], D-A44[A][C], D-A54/A64, D-B54/B64, D-A59W, D-B59W) in the following conditions: 1. The wiring length to load is more than 30 m; 2. When using PLC with large flow current.

Contact Protection Box Specifications

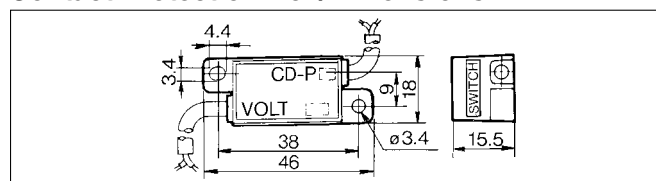
Part no.	CD-P11	CD-P12
Load voltage	100 VAC or less	200 VAC
Max. load current	25 mA	12.5 mA
		50 mA

* Lead wire length — Switch connection side 0.5 m
Load connection side 0.5 m

Contact Protection Box Internal Circuit



Contact Protection Box/Dimensions

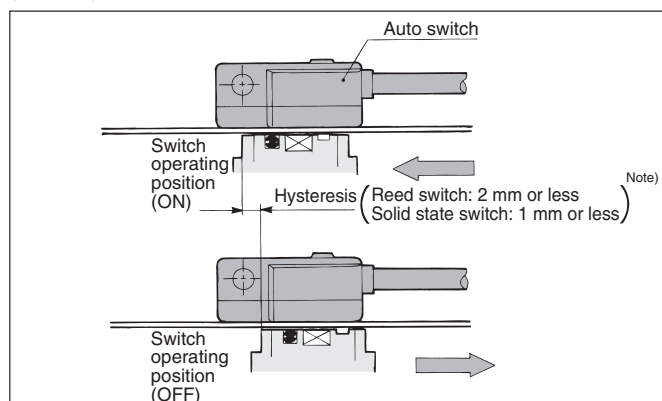


Contact Protection Box Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 meter.

Auto Switch Hysteresis

Hysteresis is the distance between the position at which piston movement operates an auto switch to the position at which reverse movement turns the switch off. This hysteresis is included in part of the operating range (one side).



Note) Hysteresis may fluctuate due to the operating environment.
Please contact SMC if hysteresis causes an operational problem.

MHZ

MHF

MHL

MHR

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

D-

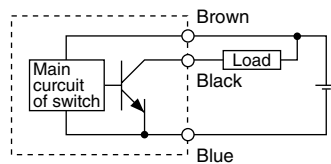
20-

Before Operation

Auto Switches Connection and Example

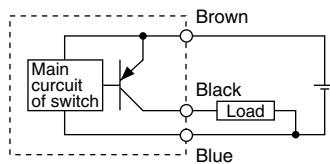
Basic Wiring

Solid state 3-wire, NPN

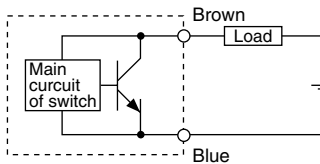


(Power supply for switch and load are separate)

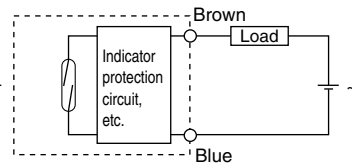
Solid state 3-wire, PNP



Solid state 2-wire

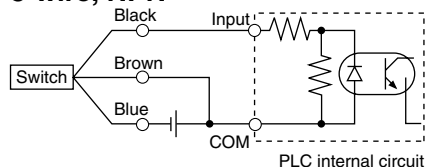


Reed switch 2-wire

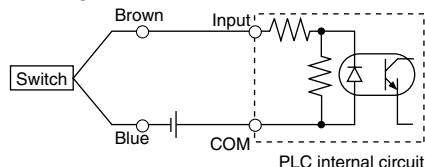


Example of Connection with PLC (Programmable Logic Controller)

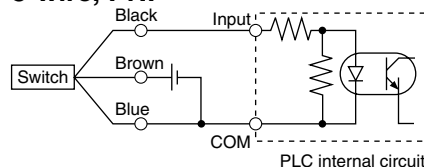
• Sink input specifications 3-wire, NPN



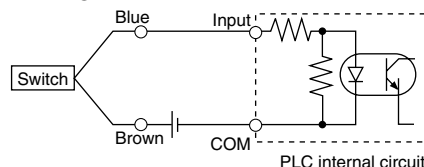
2-wire



• Source input specifications 3-wire, PNP



2-wire

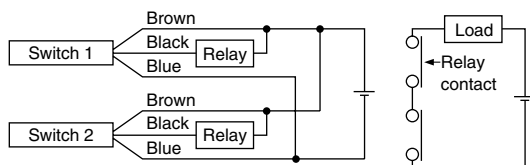


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

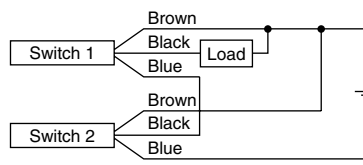
Example of AND (Series) and OR (Parallel) Connection

• 3-wire

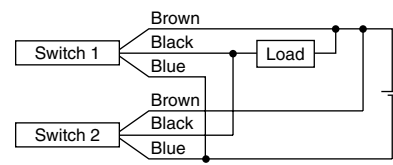
AND connection for NPN output (Using relays)



AND connection for NPN output (Performed with switches only)



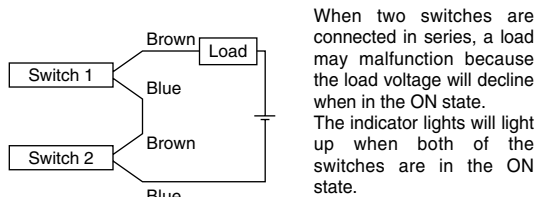
OR connection for NPN output



The indicator lights will light up when both switches are turned ON.

• 2-wire

2-wire with 2-switch AND connection

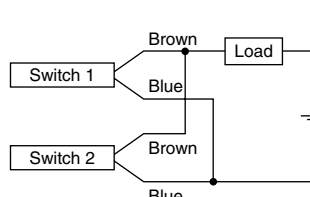


When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state. The indicator lights will light up when both of the switches are in the ON state.

$$\begin{aligned} \text{Load voltage at ON} &= \text{Power supply voltage} - \text{Residual voltage} \times 2 \text{ pcs.} \\ &= 24 \text{ V} - 4 \text{ V} \times 2 \text{ pcs.} \\ &= 16 \text{ V} \end{aligned}$$

Example: Power supply is 24 VDC
Internal voltage drop in switch is 4 V.

2-wire with 2-switch OR connection



(Solid state switch)
When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

$$\begin{aligned} \text{Load voltage at OFF} &= \text{Leakage current} \times 2 \text{ pcs.} \times \text{Load impedance} \\ &= 1 \text{ mA} \times 2 \text{ pcs.} \times 3 \text{ k}\Omega \\ &= 6 \text{ V} \end{aligned}$$

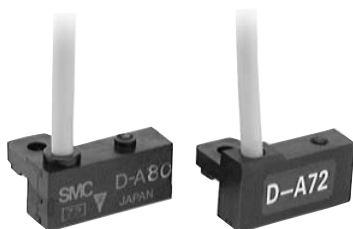
Example: Load impedance is 3 k Ω .
Leakage current from switch is 1 mA.

(Reed switch)
Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes grow dim or not light up, due to the dispersion and reduction of the current flowing to the switches.

Reed Switch Band Mounting Style D-A72/D-A73/D-A80

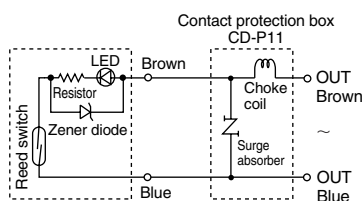
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Grommet
Electrical entry: Perpendicular

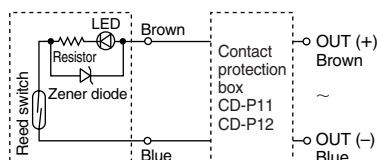


Auto Switch Internal Circuit

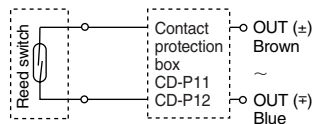
D-A72



D-A73



D-A80



Note 1) Operating load is an induction load.

Note 2) Wiring to the load is 5 m or longer.

Note 3) Load voltage is 100 VAC.

Use the contact protection box in any of the above listed situations. The contact point life may decrease. (Refer to page 12-13-5 for contact protection box.)

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-A7 (With indicator light)			
Auto switch model	D-A72	D-A73	
Applicable load	Relay, PLC	Relay, PLC	
Load voltage	200 VAC	24 VDC	100 VAC
Load current range ⁽³⁾	5 to 10 mA	5 to 40 mA	5 to 20 mA
Contact protection circuit	None		
Internal voltage drop	2.4 V or less		
Indicator light	Red LED lights when ON.		
D-A8 (Without indicator light)			
Auto switch model	D-A80		
Applicable load	Relay, IC circuit, PLC		
Load voltage	24 V ^{AC} _{DC} or less	48 V ^{AC} _{DC}	100 V ^{AC} _{DC}
Maximum load current	50 mA	40 mA	20 mA
Contact protection circuit	None		
Internal resistance	1 Ω or less (Including lead wire length of 3 m)		

• Lead wire — Oil resistant vinyl heavy-duty cord, ø3.4, 0.2 mm², 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the reed switches, refer to page 12-13-5.

Note 2) Regarding the lead wire length, refer to page 12-13-5.

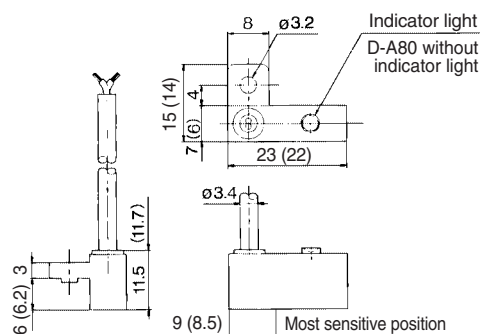
Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

Auto switch model		D-A72	D-A73	D-A80
Lead wire length (m)	0.5	10	10	10
	3	47	47	47
	5	—	77	—

(g)

Dimensions

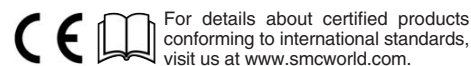


() values for D-A72

Reed Switch

Rail Mounting Style

D-A7□H/D-A80H

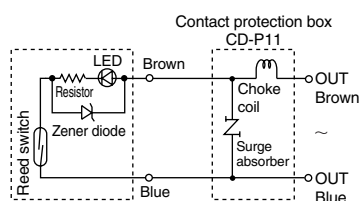


Grommet Electrical entry: In-line

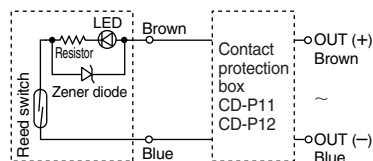


Auto Switch Internal Circuit

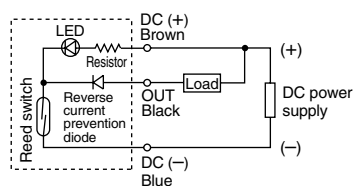
D-A72H



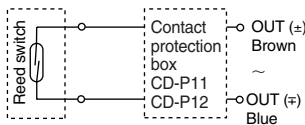
D-A73H



D-A76H



D-A80H



Note 1) Operating load is an induction load.

Note 2) In the case the wiring length to load is more than 5 m.

Note 3) Wiring to the load is 5 m or longer.

Use the contact protection box in any of the above listed situations. The contact point life may decrease. **Especially in the case of D-A72H, be sure to use the contact protection box.** (Refer to page 12-13-5 for contact protection box.)

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-A7□H (With indicator light)

Auto switch model	D-A72H	D-A73H		D-A76H
Applicable load	Relay, PLC	Relay, PLC		IC circuit
Load voltage	200 VAC	24 VDC	100 VAC	4 to 8 VDC
Max. load voltage/Load current range ⁽³⁾	5 to 10 mA	5 to 40 mA	5 to 20 mA	20 mA
Contact protection circuit	2.4 V or less			0.8 V or less
Internal voltage drop	None			
Indicator light	Red LED lights when ON.			

D-A80H (Without indicator light)

Auto switch model	D-A80H		
Applicable load	Relay, IC circuit, PLC		
Load voltage	24 V ^{AC} DC or less	48 V ^{AC} DC	100 V ^{AC} DC
Maximum load current	50 mA	40 mA	20 mA
Contact protection circuit	None		
Internal resistance	1 Ω or less (Including lead wire length of 3 m)		

• Lead wire — Oil resistant vinyl heavy-duty cord, 0.2 mm², 2 cores (Brown, Blue), 3 cores (Brown, Black, Blue), 0.5 m

Note 1) Regarding the common specifications of the reed switches, refer to page 12-13-5.

Note 2) Regarding the lead wire length, refer to page 12-13-5.

Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

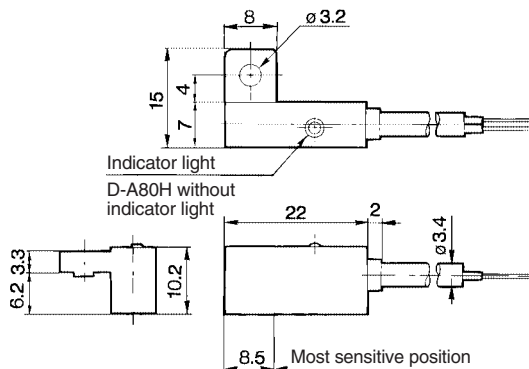
Weight

(g)

Auto switch model	D-A72H	D-A73H	D-A76H	D-A80H
Lead wire length (m)	0.5	10	10	10
	3	47	47	47
	5	—	77	—

Dimensions

D-A7□H, D-A80H



Reed Switch

Rail Mounting Style

D-A73C/D-A80C

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Connector



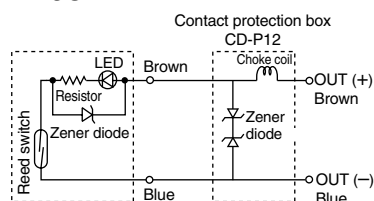
Caution

Precautions

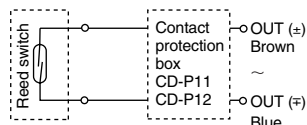
1. Confirm that the connector is appropriately tightened. If tightened insufficiently, the waterproof performance will deteriorate.
2. Refer to Best Pneumatics Vol. 6/7/8/9/10 for the details.

Auto Switch Internal Circuit

D-A73C



D-A80C



Note 1) Operating load is an induction load.
 Note 2) Wiring to the load is 5 m or longer.
 Use the contact protection box in any of the above listed situations. The contact point life may decrease. (Refer to page 12-13-5 for contact protection box.)

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-A73C (With indicator light)	
Auto switch model	D-A73C
Applicable load	Relay, PLC
Load voltage	24 VDC
Load current range	5 to 40 mA
Contact protection circuit ⁽⁴⁾	None
Internal voltage drop	2.4 V or less
Indicator light	Red LED lights when ON.
D-A80C (Without indicator light)	
Auto switch model	D-A80C
Applicable load	Relay, IC circuit, PLC
Load voltage	24 V _{DC} ^{AC}
Maximum load current	50 mA
Contact protection circuit	None
Internal resistance	1 Ω or less (Including lead wire length of 3 m)

• Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.2 mm², 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the reed switches, refer to page 12-13-5.

Note 2) Regarding the lead wire length, refer to page 12-13-5.

Note 3) Lead wire with connector may be shipped with switch.

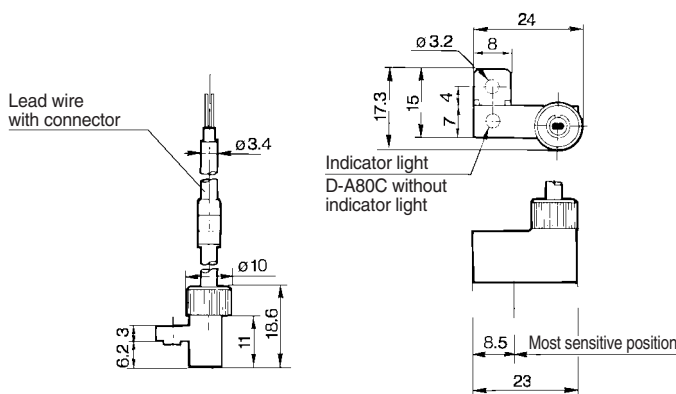
Note 4) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

(g)

Auto switch model		D-A73C	D-A80C
Lead wire length (m)	0.5	12	12
	3	54	54
	5	84	84

Dimensions



Reed Switch

Direct Mounting Style

D-A90(V)/D-A93(V)/D-A96(V)



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Grommet Electrical entry: In-line



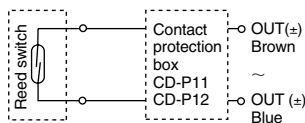
⚠ Caution

Precautions

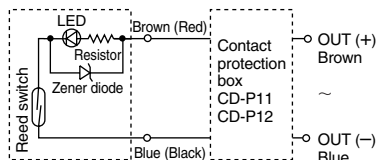
1. Fix the switch with appropriate screw installed on the switch body. If using other screws, switch may be damaged.

Auto Switch Internal Circuit
Colors of lead wire inside () are the ones before conformed to IEC standard.

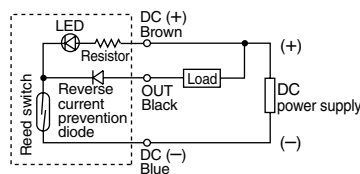
D-A90V



D-A93V



D-A96V



Note 1) Operating load is an induction load.

Note 2) Wiring to the load is 5 m or longer.

Note 3) Load voltage is 100 VAC.

Use the contact protection box in any of the above listed situations. The contact point life may decrease. (Refer to page 12-13-5 for contact protection box.)

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-A90, D-A90V (Without indicator light)

Auto switch model	D-A90, D-A90V		
Applicable load	IC circuit, Relay, PLC		
Load voltage	24 V $\frac{AC}{DC}$ or less	48 V $\frac{AC}{DC}$ or less	100 V $\frac{AC}{DC}$ or less
Maximum load current	50 mA	40 mA	20 mA
Contact protection circuit	None		
Internal resistance	1 Ω or less (Including lead wire length of 3 m)		

D-A93, D-A93V, D-A96, D-A96V (With indicator light)

Auto switch model	D-A93, D-A93V	D-A96, D-A96V
Applicable load	Relay, PLC	IC circuit
Load voltage	24 VDC	100 VAC
Load current range and Maximum load current ⁽³⁾	5 to 40 mA	20 mA
Contact protection circuit	None	
Internal voltage drop	D-A93 — 2.4 V or less (up to 20 mA)/3 V or less (up to 40 mA) D-A93V — 2.7 V or less	0.8 V or less
Indicator light	Red LED lights when ON.	

• Lead wire

D-A90(V)/D-A93(V)—Oil resistant vinyl heavy-duty cord, $\phi 2.7$, 0.18 mm² x 2 cores (Brown, Blue), 0.5 m
D-A96(V)—Oil resistant vinyl heavy-duty cord, $\phi 2.7$, 0.15 mm² x 3 cores (Brown, Black, Blue), 0.5 m

Note 1) Regarding the common specifications of the reed switches, refer to page 12-13-5.

Note 2) Regarding the lead wire length, refer to page 12-13-5.

Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

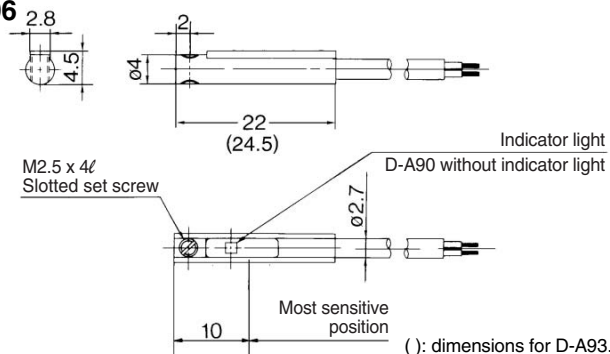
Weight

(g)

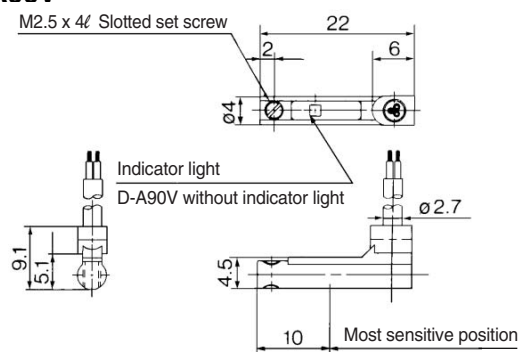
Model	D-A90	D-A90V	D-A93	D-A93V	D-A96	D-A96V
Lead wire length: 0.5 m	6	6	6	6	8	8
Lead wire length: 3 m	30	30	30	30	41	41

Dimensions

D-A90, D-A93, D-A96



D-A90V, D-A93V, D-A96V



2-color Indication Type Reed Switch

Rail Mounting Style

D-A79W

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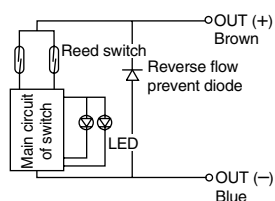
Grommet

The optimum operating position can be determined by the color of the light.
(Red → Green ← Red)

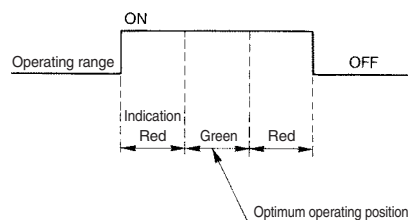


Auto Switch Internal Circuit

D-A79W



Indicator light/Display method



Note 1) Operating load is an induction load.
Note 2) Wiring to the load is 5 m or longer.
Use the contact protection box in any of the above listed situations. The contact point life may decrease. (Refer to page 12-13-5 for contact protection box.)

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-A79W (With indicator light)	
Auto switch model	D-A79W
Applicable load	Relay, PLC
Load voltage	24 VDC
Load current range ⁽³⁾	5 to 40 mA
Contact protection circuit	None
Internal voltage drop	4 V or less
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.

• Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.2 mm², 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the reed switches, refer to page 12-13-5.

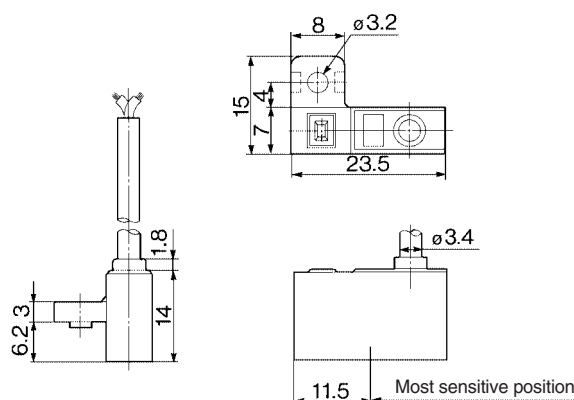
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Note 3) Under 5 mA, the strength of the indicator light is poor. In some cases, visibility of the indicator light will not be possible where the output signal is less than 2.5 mA. However, there is no problem in terms of contact output, when an output signal exceeds 1 mA or more.

Weight

Auto switch model		D-A79W
Lead wire length (m)	0.5	11
	3	53
	5	—

Dimensions



Solid State Switch Rail Mounting Style *D-F79/D-F7P/D-J79*

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Grommet



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F7□, D-J79 (With indicator light)

Auto switch model	D-F79	D-F7P	D-J79
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, Relay, PLC		24 VDC Relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 VDC)		—
Current consumption	10 mA or less		—
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less	80 mA or less	5 to 40 mA
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)	0.8 V or less	4 V or less
Leakage current	100 μ A or less at 24 VDC		0.8 mA or less at 24 VDC
Indicator light	Red LED lights when ON.		

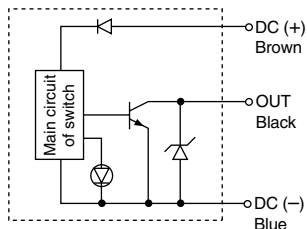
- Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.2 mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

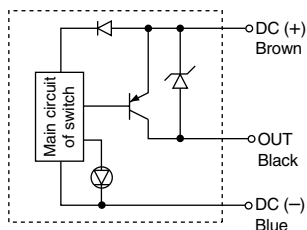
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Auto Switch Internal Circuit

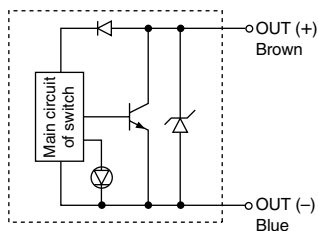
D-F79



D-F7P



D-J79

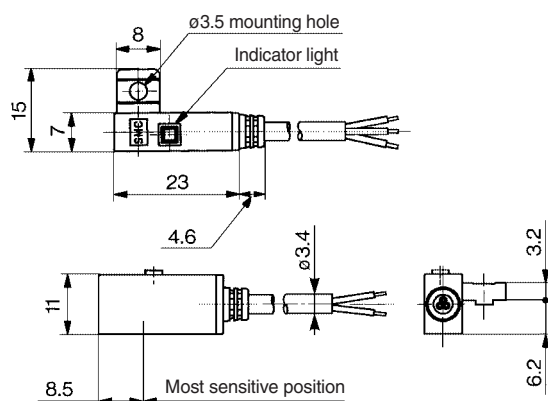


Weight

Auto switch model		D-F79	D-F7P	D-J79
Lead wire length (m)	0.5	13	13	11
	3	57	57	50
	5	92	92	81

(g)

Dimensions



Solid State Switch Rail Mounting Style *D-F7NV/D-F7PV/D-F7BV*



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Grommet Electrical entry: Perpendicular



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F7□V (With indicator light)			
Auto switch model	D-F7NV	D-F7PV	D-F7BV
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, Relay, PLC		24 VDC Relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 VDC)		—
Current consumption	10 mA or less		—
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less	80 mA or less	5 to 40 mA
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)	0.8 V or less	4 V or less
Leakage current	100 μ A or less at 24 VDC		0.8 mA or less at 24 VDC
Indicator light	Red LED lights when ON.		

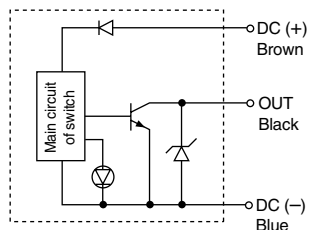
- Lead wire — Oil resistant vinyl heavy-duty cord, ϕ 3.4, 0.2 mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

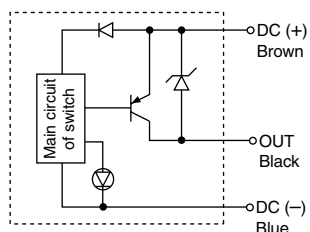
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Auto Switch Internal Circuit

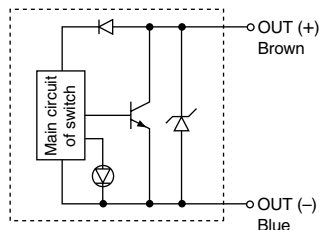
D-F7NV



D-F7PV



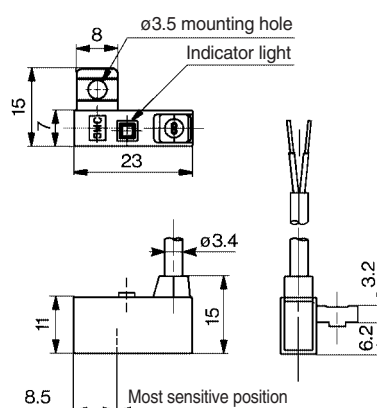
D-F7BV



Weight

					(g)
Auto switch model		D-F7NV	D-F7PV	D-F7BV	
Lead wire length (m)	0.5	13	13	11	
	3	57	57	50	
	5	92	92	81	

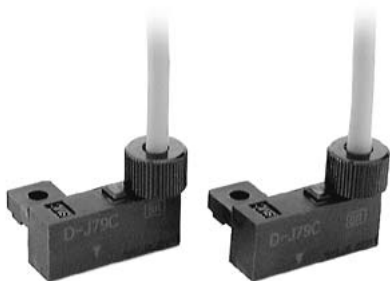
Dimensions



Solid State Switch Rail Mounting Style D-J79C

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Connector



Caution

Precautions

1. Confirm that the connector is appropriately tightened. If tightened insufficiently, the waterproof performance will deteriorate.
2. Refer to Best Pneumatics Vol. 6/7/8/9/10 for the details.

Auto Switch Specifications

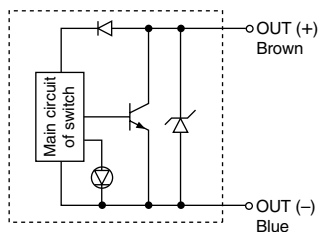
PLC: Abbreviation of Programmable Logic Controller

D-J79C	
Auto switch model	D-J79C
Wiring type	2-wire
Output type	—
Applicable load	24 VDC Relay, PLC
Power supply voltage	—
Current consumption	—
Load voltage	24 VDC (10 to 28 VDC)
Load current	5 to 40 mA
Internal voltage drop	4 V or less
Leakage current	0.8 mA or less at 24 VDC
Indicator light	Red LED lights when ON.

- Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.2 mm², 2 cores (Brown, Blue), 0.5 m
- Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Auto Switch Internal Circuit

D-J79C

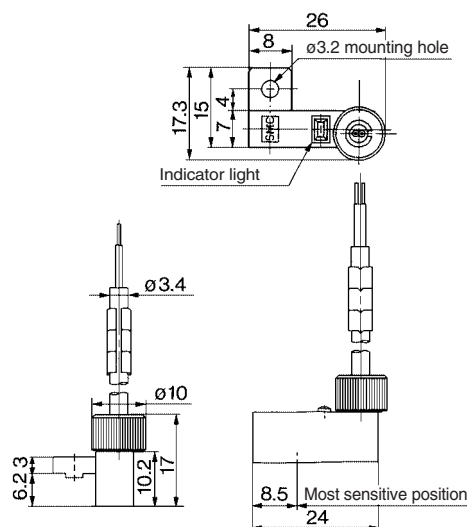


Weight

Auto switch model		D-J79C
Lead wire length (m)	0.5	13
	3	52
	5	83

(g)

Dimensions



Solid State Switch

Direct Mounting Style

D-F8N/D-F8P/D-F8B

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Grommet



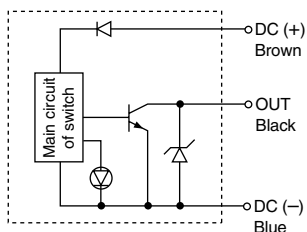
Caution

Precautions

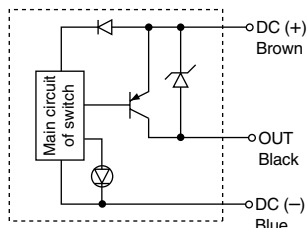
Fix the switch with appropriate screw installed on the switch body. If using other screws, switch may be damaged.

Auto Switch Internal Circuit

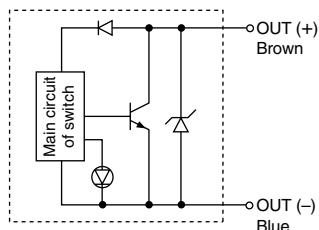
D-F8N



D-F8P



D-F8B



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

Auto switch model	D-F8N	D-F8P	D-F8B
Electrical entry direction	Perpendicular	Perpendicular	Perpendicular
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, 24 VDC Relay, PLC		24 VDC relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 VDC)		—
Current consumption	10 mA or less		—
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less	80 mA or less	2.5 to 40 mA
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)	0.8 V or less	4 V or less
Leakage current	100 μ A or less at 24 VDC		0.8 mA or less at 24 VDC
Indicator light	Red LED lights when ON.		

- Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 2.7$, 0.5 m
D-F8N, D-F8P 0.15 mm² x 3 cores (Brown, Black, Blue)
D-F8B 0.18 mm² x 2 cores (Brown, Blue)

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.
Note 2) Regarding the lead wire length, refer to page 12-13-5.

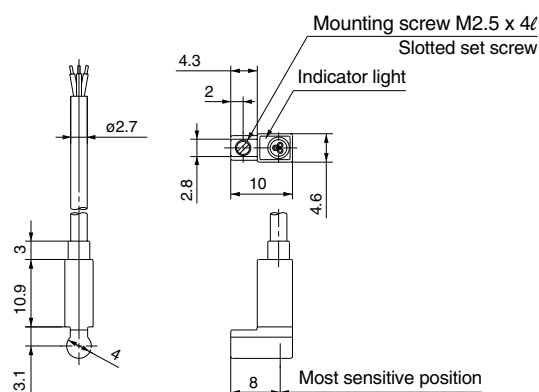
Weight

Auto switch model		D-F8N	D-F8P	D-F8B
Lead wire length (m)	0.5	7	7	7
	3	32	32	32
	5	52	52	52

(g)

Dimensions

D-F8N, D-F8P, D-F8B



Solid State Switch Direct Mounting Style *D-M9N(V)/D-M9P(V)/D-M9B(V)*



For details about certified products conforming to international standards, visit us at www.smcworld.com.

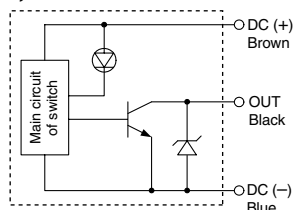
Grommet

- Lower load current
- Lead free solder
- Using UL certified (style 2844) lead wire

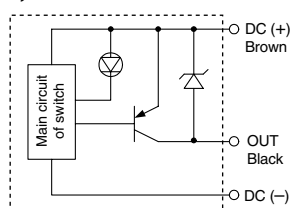


Auto Switch Internal Circuit

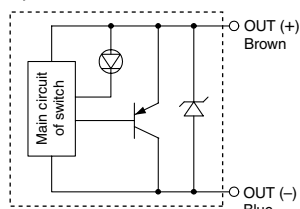
D-M9N, D-M9NV



D-M9P, D-M9PV



D-M9B, D-M9BV



Operating range shortened, compared to conventional types.

When replacing conventional types, dependant upon application, the shortened operating range may cause auto switch imperceptive.

- When the range of stroke is wider than the operating range. Example) Stamping, press-fitting, clamping, etc.
- When used to detect intermediate position. (Detection output time is shortened.)

(Note) Please consult with SMC regarding details of operation range by each actuator.

Since short circuit protection circuit is not built-in, the auto switch will be immediately damaged when the load is short-circuited. Be careful not to exchange the power cable (brown) with the output cable (black).

12-13-16

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-M9□, D-M9□V (With indicator light)						
Auto switch model	D-M9N	D-M9NV	D-M9P	D-M9PV	D-M9B	D-M9BV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)				—	
Current consumption	10 mA or less				—	
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less				2.5 to 40 mA	
Internal voltage drop	0.8 V or less				4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less	
Indicator light	Red LED lights when ON.					

- Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 2.7 \times 3.2$ ellipse 0.15 mm², 2 cores (D-M9B), 3 cores (D-M9N, D-M9P)

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

Note 2) Regarding the lead wire length, refer to page 12-13-5.

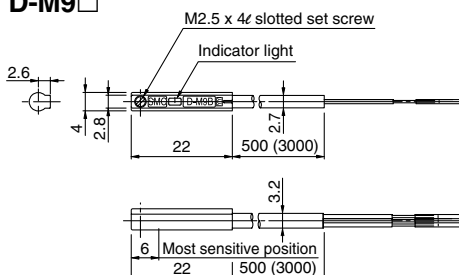
Weight

(g)

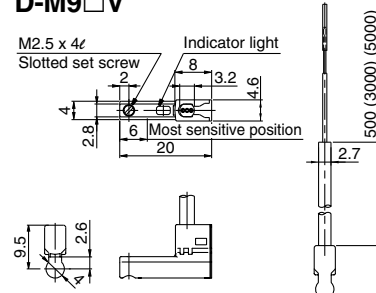
Auto switch model		D-M9N(V)	D-M9P(V)	D-M9B(V)
Lead wire length (m)	0.5	8	8	7
	3	41	41	38
	5	68	68	63

Dimensions

D-M9□



D-M9□V



⚠ Precautions

Be sure to read before handling. Please contact SMC when using beyond specifications.

Caution on Handling

⚠ Caution

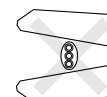
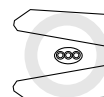
During installation, secure the rod cover and tighte

- Over-current protection is not equipped with this product series. When it is wired incorrectly or a load is short-circuited, a switch may be damaged or burned.
- In the event of stripping cable sheath, use caution for the stripping direction. Its insulation may be torn or damaged, depending on the direction.
- Below is given as the recommended tool.

Maker	Product's name	Part no.
VESSEL Co., Inc.	Wirestripper	No 3000G
Tokyo Ideal Co., Ltd.	Stripmaster	45-089

* As for 2-wire, a stripper for round shape cord ($\phi 2.0$) is usable.

- Fix the switch with appropriate screw installed on the switch body. If using other screws, switch may be damaged.



Solid State Switch Direct Mounting Style *D-Y59^A_B/D-Y69^A_B/D-Y7P(V)*



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Grommet



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-Y5□, D-Y6□, D-Y7P, D-Y7PV (With indicator light)						
Auto switch model	D-Y59A	D-Y69A	D-Y7P	D-Y7PV	D-Y59B	D-Y69B
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)				—	
Current consumption	10 mA or less				—	
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less		80 mA or less		5 to 40 mA	
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)		0.8 V or less		4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less at 24 VDC	
Indicator light	Red LED lights when ON.					

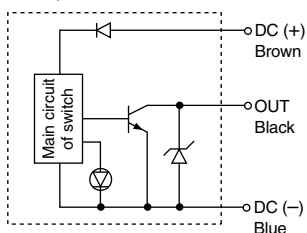
• Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.15 mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

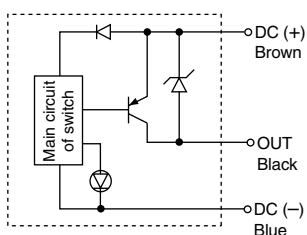
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Auto Switch Internal Circuit

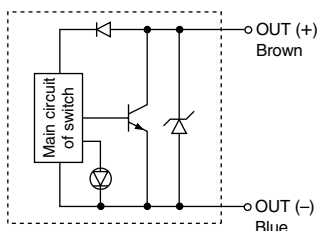
D-Y59A, D-Y69A



D-Y7P, D-Y7PV



D-Y59B, D-Y69B



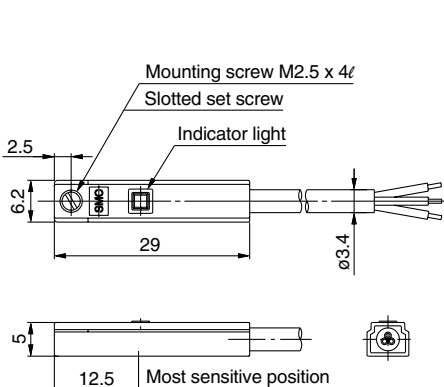
Weight

Auto switch model	D-Y59B	D-Y69B	D-Y59A	D-Y69A	D-Y7P(V)
Lead wire length (m)	0.5	9	10	10	10
	3	50	53	53	53
	5	83	87	87	87

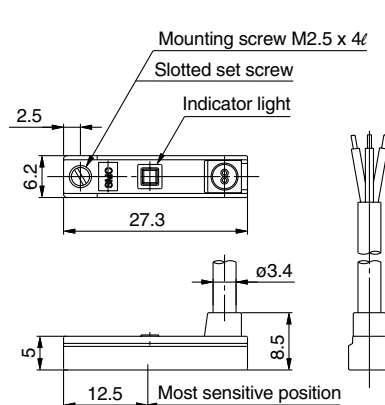
(g)

Dimensions

D-Y59A, D-Y7P, D-Y59B



D-Y69A, D-Y7PV, D-Y69B



2-color Indication Type Solid State Switch Rail Mounting Style D-F79W/D-F7PW/D-J79W

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Grommet

The optimum operating position can be determined by the color of the light.
(Red → Green ← Red)



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F7□W, D-J79W			
Auto switch model	D-F79W	D-F7PW	D-J79W
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, Relay, PLC		24 VDC Relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 VDC)		—
Current consumption	10 mA or less		—
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less	80 mA	5 to 40 mA
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)	0.8 V or less	4 V or less
Leakage current	100 μA or less at 24 VDC		0.8 mA or less at 24 VDC
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.		

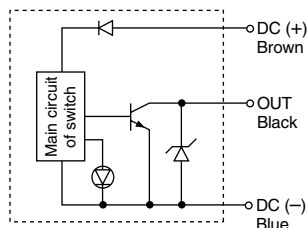
- Lead wire — Oil resistant vinyl heavy-duty cord, ø3.4, 0.2 mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

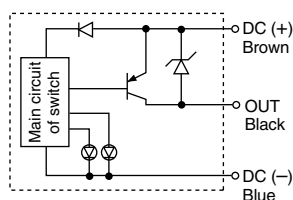
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Auto Switch Internal Circuit

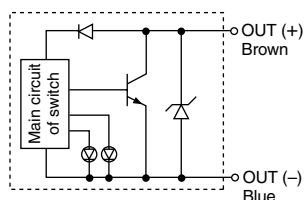
D-F79W



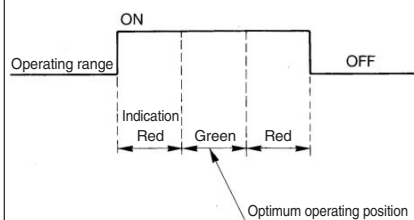
D-F7PW



D-J79W



Indicator light/Display method

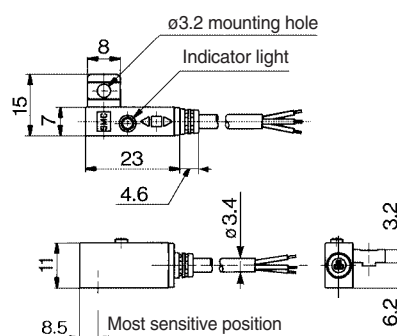


Weight

Auto switch model		D-F79W	D-F7PW	D-J79W
Lead wire length (m)	0.5	13	13	11
	3	57	57	50
	5	92	92	81

(g)

Dimensions



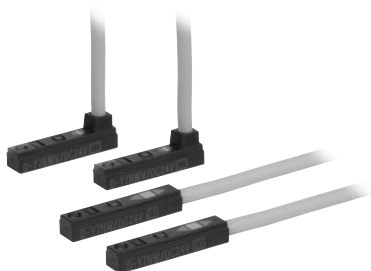
2-color Indication Type Solid State Switch Direct Mounting Style D-Y7NW(V)/D-Y7PW(V)/D-Y7BW(V)



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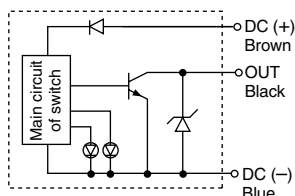
Grommet

The optimum operating position can be determined by the color of the light. (Red → Green ← Red)

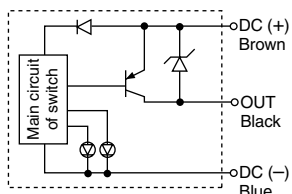


Auto Switch Internal Circuit

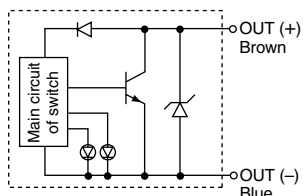
D-Y7NW, D-Y7NWV



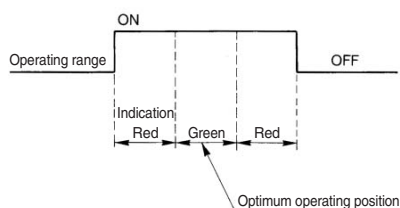
D-Y7PW, D-Y7PWV



D-Y7BW, D-Y7BWV



Indicator light/Display method



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-Y7□W, D-Y7□WV (With indicator light)						
Auto switch model	D-Y7NW	D-Y7NWV	D-Y7PW	D-Y7PWV	D-Y7BW	D-Y7BWV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 VDC)				—	
Current consumption	10 mA or less				—	
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less		80 mA or less		5 to 40 mA	
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)		0.8 V or less		4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less at 24 VDC	
Indicator light	Operating position-----Red LED lights when ON. Optimum operating position-----Green LED lights when ON.					

- Lead wire — Oil resistant, flexible vinyl heavy-duty cord, ϕ 3.4, 0.15 mm², 3 cores (Brown, Black, Blue), 2 cores (Brown, Blue), 0.5 m

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

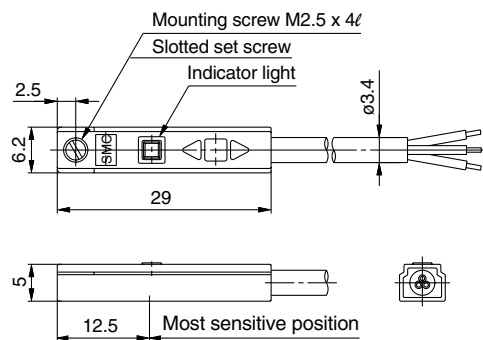
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Weight

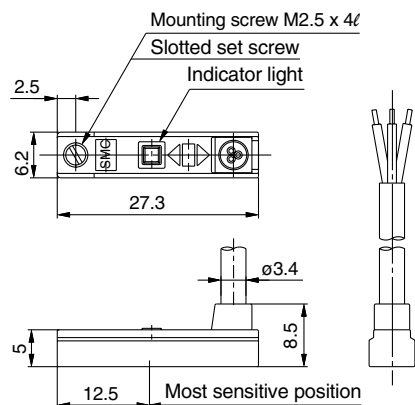
Auto switch model		D-Y7NW(V)	D-Y7PW(V)	D-Y7BW(V)
Lead wire length (m)	0.5	11	11	11
	3	54	54	54
	5	88	88	88

Dimensions

D-Y7□W



D-Y7□WV



2-color Indication Type Solid State Switch Direct Mounting Style *D-F9NW(V)/D-F9PW(V)/D-F9BW(V)*



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Grommet



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F9□W, D-F9□WV (With indicator light)						
Auto switch model	D-F9NW	D-F9NWV	D-F9PW	D-F9PWV	D-F9BW	D-F9BWV
Electrical entry direction	In-line	Perpendicular	In-line	Perpendicular	In-line	Perpendicular
Wiring type	3-wire				2-wire	
Output type	NPN		PNP		—	
Applicable load	IC circuit, Relay, PLC				24 VDC Relay, PLC	
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)				—	
Current consumption	10 mA or less				—	
Load voltage	28 VDC or less		—		24 VDC (10 to 28 VDC)	
Load current	40 mA or less		80 mA or less		5 to 40 mA	
Internal voltage drop	1.5 V or less (0.8 V or less at 10 mA load current)		0.8 V or less		4 V or less	
Leakage current	100 μA or less at 24 VDC				0.8 mA or less	
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.					

- Lead wire — Oil resistant vinyl heavy-duty cord: $\phi 2.7$, 3 cores (Brown, Black, Blue), 0.15 mm²
2 cores (Brown, Blue) 0.18 mm², 0.5 m

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.
Note 2) Regarding the lead wire length, refer to page 12-13-5.

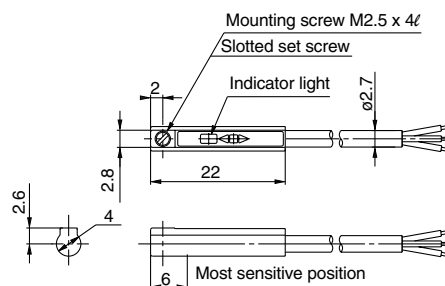
Weight

(g)

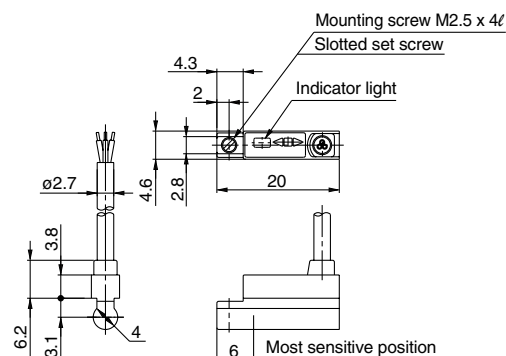
Auto switch model	D-F9NW(V)	D-F9PW(V)	D-F9BW(V)
Lead wire length (m)	0.5	7	7
3	34	34	32
5	56	56	52

Dimensions

D-F9□W

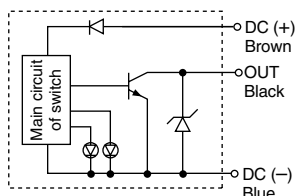


D-F9□WV

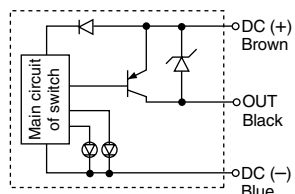


Auto Switch Internal Circuit

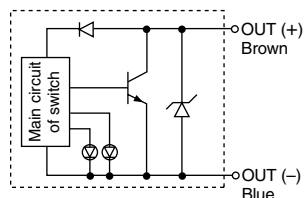
D-F9NW, D-F9NWV



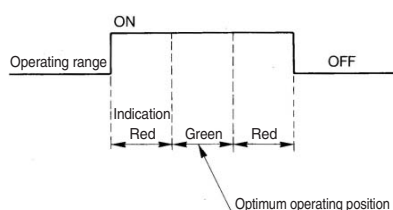
D-F9PW, D-F9PWV



D-F9BW, D-F9BWV



Indicator light/Display method



2-color Indication Type with Diagnostic Output Solid State Switch: Rail Mounting Style D-F79F

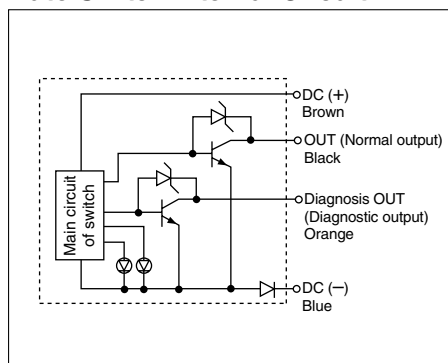
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Grommet

Since the output signal can be detected in an unsteady detecting area, the difference of detecting position can be confirmed by the side of PLC (Programmable Logic Controller).



Auto Switch Internal Circuit



Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F79F (With indicator light)	
Auto switch model	D-F79F
Wiring	4-wire
Output	NPN
Diagnostic output	Normal operation
Applicable load	IC circuit, Relay, PLC
Power voltage	5, 12, 24 VDC (4.5 to 28 VDC)
Current consumption	10 mA or less
Load voltage	28 VDC or less
Load current	50 mA or less at the total amount of normal output and diagnostic output
Internal voltage drop	1.5 V or less (0.8 V or less at 5 mA)
Current leakage	100 μ A or less at 24 VDC
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.

• Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.2 mm², 4 cores (Brown, Black, Orange, Blue), 0.5 m
Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.
Note 2) Regarding the lead wire length, refer to page 12-13-5.

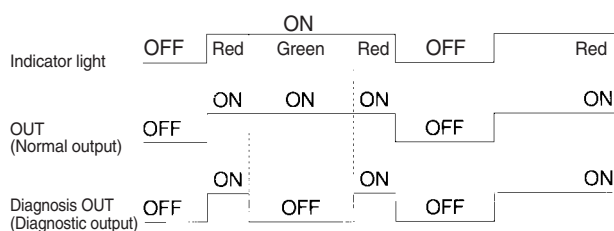
Weight

Auto switch model	D-F79F	
Lead wire length (m)	0.5	13
	3	56
	5	90

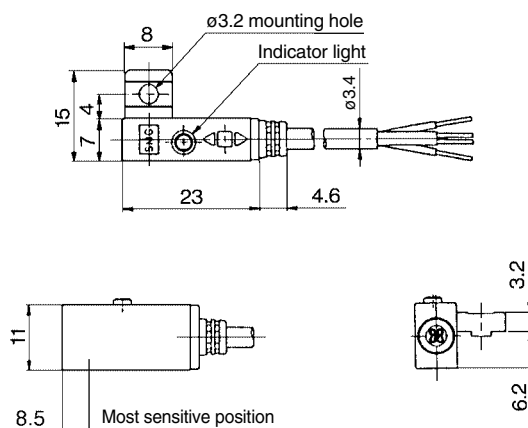
(g)

Diagnostic Output Operation

The diagnostic signal is output within unsteady detecting area (where indicator light is Red), and the diagnostic output becomes OFF when the detecting position remains within the optimum operating position (where indicator is Green). When the detecting position is not adjusted, the diagnostic output becomes ON.



Dimensions



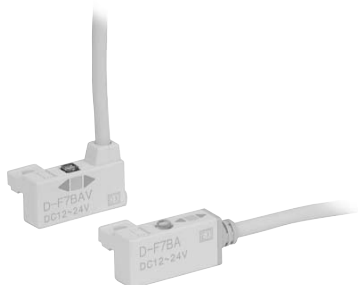
Water Resistant 2-color Indication Type Solid State Switch: Rail Mounting Style

D-F7BA(V)L

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Grommet

Water (coolant) resistant type



Caution

Precautions

Please consult with SMC if using coolant liquid other than water based solution.

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F7BA(V)L (With indicator light)		
Auto switch model	D-F7BAL	D-F7BAVL
Electrical entry direction	In-line	Perpendicular
Wiring type	2-wire	
Output type	—	
Applicable load	24 VDC Relay, PLC	
Power supply voltage	—	
Current consumption	—	
Load voltage	24 VDC (10 to 28 VDC)	
Load current	5 to 40 mA	
Internal voltage drop	4 V or less	
Leakage current	0.8 mA or less at 24 VDC	
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.	

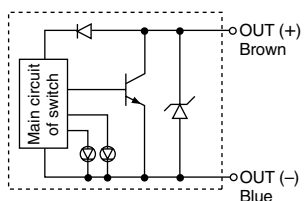
• Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 3.4$, 0.2 mm², 2 cores (Brown, Blue), 3 m (Standard)
 Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.
 Note 2) Regarding the lead wire length, refer to page 12-13-5.

Weight

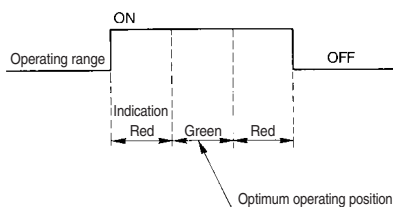
(g)

Auto switch model		D-F7BA	D-F7BAV
Lead wire length (m)	0.5	—	—
	3	50	50
	5	81	81

Auto Switch Internal Circuit

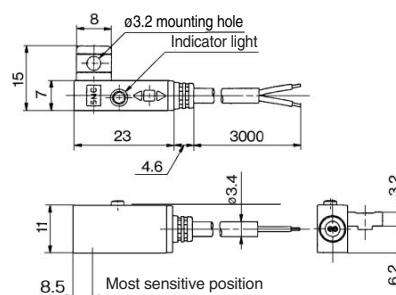


Indicator light/Display method

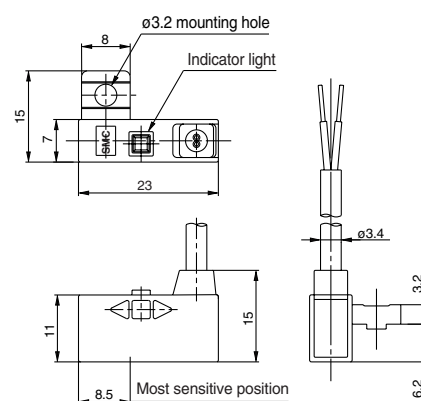


Dimensions

D-F7BAL



D-F7BAVL



Water Resistant 2-color Indication Type Solid State Switch: Direct Mounting Style

D-F9BAL

CE For details about certified products conforming to international standards, visit us at www.smcworld.com.

Grommet

Water (coolant) resistant type



Caution

Precautions

Please consult with SMC if using coolant liquid other than water based solution.

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-F9BAL (With indicator light)	
Auto switch model	D-F9BAL
Wiring type	2-wire
Output type	—
Applicable load	24 VDC Relay, PLC
Power supply voltage	—
Current consumption	—
Load voltage	24 VDC (10 to 28 VDC)
Load current	5 to 30 mA
Internal voltage drop	5 V or less
Leakage current	1 mA or less at 24 VDC
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.

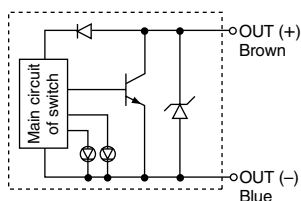
- Lead wire — Oil resistant vinyl heavy-duty cord, $\phi 2.7$, 2 cores (Brown, Blue), 0.18 mm², 0.5 m
- Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.
- Note 2) Regarding the lead wire length, refer to page 12-13-5.

Weight

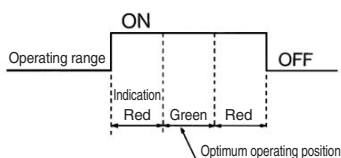
Auto switch model		D-F9BA
Lead wire length (m)	0.5	—
	3	37
	5	57

(g)

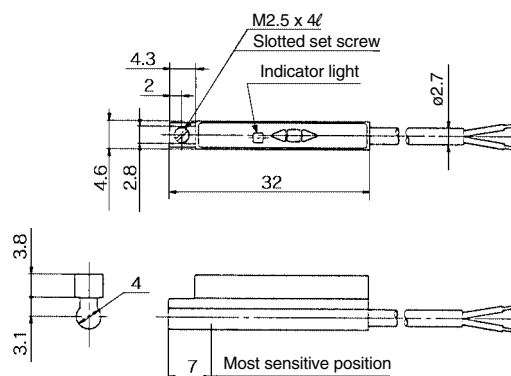
Auto Switch Internal Circuit



Indicator light/Display method



Dimensions



MHZ

MHF

MHL

MHR

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

D-

20-

Water Resistant 2-color Indication Type Solid State Switch: Direct Mounting Style

D-Y7BAL

CE For details about certified products conforming to international standards, visit us at www.smcworld.com.

Grommet

Water (coolant) resistant type



Caution

Precautions

Please consult with SMC if using coolant liquid other than water based solution.

Auto Switch Specifications

PLC: Abbreviation of Programmable Logic Controller

D-Y7BAL (With indicator light)	
Auto switch model	D-Y7BAL
Wiring type	2-wire
Applicable load	24 VDC Relay, PLC
Load voltage	24 VDC (10 to 28 VDC)
Load current	5 to 40 mA or less
Internal voltage drop	4 V or less
Leakage current	0.8 mA or less at 24 VDC
Indicator light	Operating position.....Red LED lights when ON. Optimum operating position.....Green LED lights when ON.

- Lead wire — Oil resistant, flexible vinyl heavy-duty cord, $\phi 3.4$, 0.15 mm², 2 cores (Brown, Blue), 3 m (Standard)

Note 1) Regarding the common specifications of the solid state switches, refer to page 12-13-5.

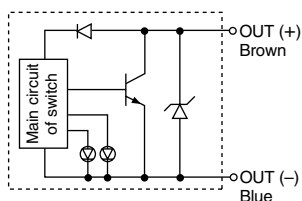
Note 2) Regarding the lead wire length, refer to page 12-13-5.

Weight

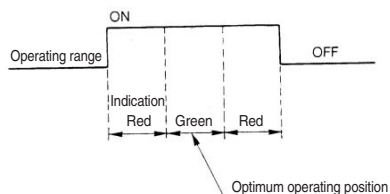
Auto switch model		D-Y7BA
Lead wire length (m)	0.5	—
	3	54
	5	88

(g)

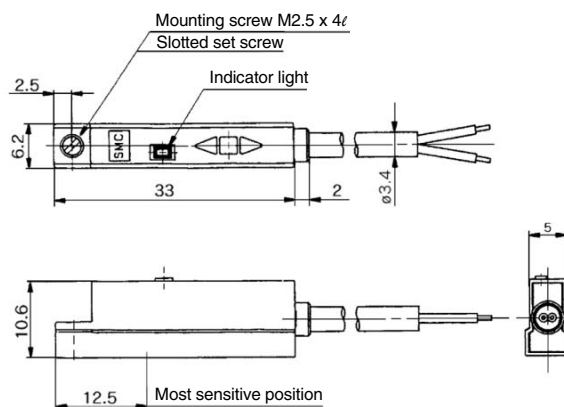
Auto Switch Internal Circuit



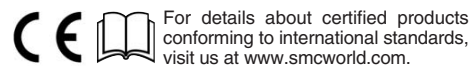
Indicator light/Display method



Dimensions



Made to Order Specifications: Solid State Switch With Pre-wired Connector



1 With Pre-wired Connector

- Eliminates the harnessing work by cable with connector specifications
- Adopts global standardized connector (IEC947-5-2)
- IP67 construction



How to Order

D—M9N S A PC

Solid state switch
Standard part no.

* For the applicable auto switch model, refer to the table below.

Cable length

S	0.5 m
M	1.0 m
L	3.0 m

Note) L is available for the D-P5DW type only.

Connector model

A	M8—3 pin
B	M8—4 pin
D	M12—4 pin

Note) Type D is available for the D-P5DW type only.

Connector Specifications

Connector model	M8—3 pin	M8—4 pin	M12—4 pin
Pin arrangement			
Conformed standard	JIS C 4524, JIS C 4525, IEC 947-5-2, NECA 0402		
Impact resistance	300 m/s ²		
Enclosure	IP-67 (IEC529 standard)		
Insulation resistance	100 MΩ or more at 500 M VDC		
Withstand voltage	1500 VAC 1 minute (between contacts), Leak current 1 mA or less		

Applicable Auto Switch

Mounting	Function	Electrical entry	Applicable model	Lead wire length		
				0.5	1.0	3.0
Rail mounting style	—	Grommet (In-line)	F79, F7P, J79	●	●	—
		Grommet (Perpendicular)	F7NV, F7PV, F7BV	●	●	—
	2-color indication	Grommet (In-line)	F79W, F7PW, J79W	●	●	—
		Grommet (Perpendicular)	F7NWV, F7BWV	●	●	—
	With diagnostic	Grommet (In-line)	F79F	●	●	—
	Water resistant		F7BA	●	●	—
	With timer		F7NT	●	●	—
	Magnetic field		P5DW	●	●	●
Band mounting style	—	Grommet (In-line)	H7A1, H7A2, H7B	●	●	—
			G59, G5P, K59	●	●	—
	2-color indication		H7NW, H7PW, H7BW	●	●	—
			G59W, G5PW, K59W	●	●	—
	Diagnostic output		H7NF, G59F	●	●	—
	Water resistant		H7BA, G5BA	●	●	—
	With timer		G5NT	●	●	—
	Wide detection		G5NB	●	●	—
Tie-rod mounting style	—	Grommet (In-line)	F59, F5P, J59	●	●	—
	2-color indication		F59W, F5PW, J59W	●	●	—
	Diagnostic output		F59F	●	●	—
	Water resistant		F5BA	●	●	—
	With timer		F5NT	●	●	—

Mounting	Function	Electrical entry	Applicable model	Lead wire length		
				0.5	1.0	3.0
Direct mounting style	—	Grommet (In-line)	M5N, M5P, M5B	●	●	—
		Grommet (Perpendicular)	Y59A, Y7P, Y59B	●	●	—
		Grommet (In-line)	M9N, M9P, M9B	●	●	—
		Grommet (Perpendicular)	M9NV, M9PV, M9BV	●	●	—
	2-color indication	Grommet (In-line)	M5NW, M5PW, M5BW	●	●	—
		Grommet (Perpendicular)	Y7NW, Y7PW, Y7BW	●	●	—
		Grommet (In-line)	F9NW, F9PW, F9BW	●	●	—
		Grommet (Perpendicular)	F9NWV, F9PWV, F9BWV	●	●	—
	Water resistant	Grommet (In-line)	Y7BA, F9BA	●	●	—
	With timer	Grommet (In-line)	M5NT, M5PT	●	●	—
Rotary actuator	—	Grommet (In-line)	S791/2, S7P1/2, T791/2	●	●	—
		Grommet (Perpendicular)	S991/2, S9P1/2, T991/2	●	●	—

With Pre-wired Connector



M8—3 pin



M8—4 pin



M12—4 pin

Connector Pin Arrangement

Sensor type	Color distinction of lead wire				Meaning of contact number			
	1 pin	2 pin	3 pin	4 pin	1 pin	2 pin	3 pin	4 pin
DC 2-wire type	Brown	—	—	Blue	OUT (+)	—	—	OUT (—)
DC 2-wire, Non-polar type	—	—	Brown	Blue	—	—	OUT (±)	OUT (F)
DC 3-wire type	Brown	—	Blue	Black	DC (+)	—	DC (—)	OUT
DC 4-wire type	Brown	Orange	Blue	Black	DC (+)	Diagnostic output	DC (—)	OUT

Connector Specifications

Connector model	M8—3 pin	M8—4 pin	M12—4 pin
Pin arrangement			
Conformed standard	JIS C 4524, JIS C 4525, IEC 947-5-2, NECA 0402		
Impact resistance	300 m/s ²		
Enclosure	IP-67 (IEC529 standard)		
Insulation resistance	100 MΩ or more at 500 M VDC		
Withstand voltage	1500 VAC 1 minute (between contacts), Leak current 1 mA or less		

Dimensions

Connector model	
M8—3 pin 4 pin	
M12—4 pin	

Connection (Female side) Connector Cable

As the parts are not supplied from SMC, refer to the application examples listed in the below.
(For detail such as catalog availability, etc., please contact each manufacturer.)

Connector size	Number of pins	Manufacturer	Applicable series example
M8	3	Corrence Corporation	M8-3D
	4		M8-4D
		OMROM Corporation	XS3
M12		Corrence Corporation	VA-4D
		OMROM Corporation	XS2
		Yamatake-Honeywell Co., Ltd.	PA5-4I
		Hirose Electric Co., Ltd.	HR24
		DKK Ltd.	CM01-8DP4S

Made to Order Specifications: Solid State Switch

-50: No Indicator (Dark room) Specifications

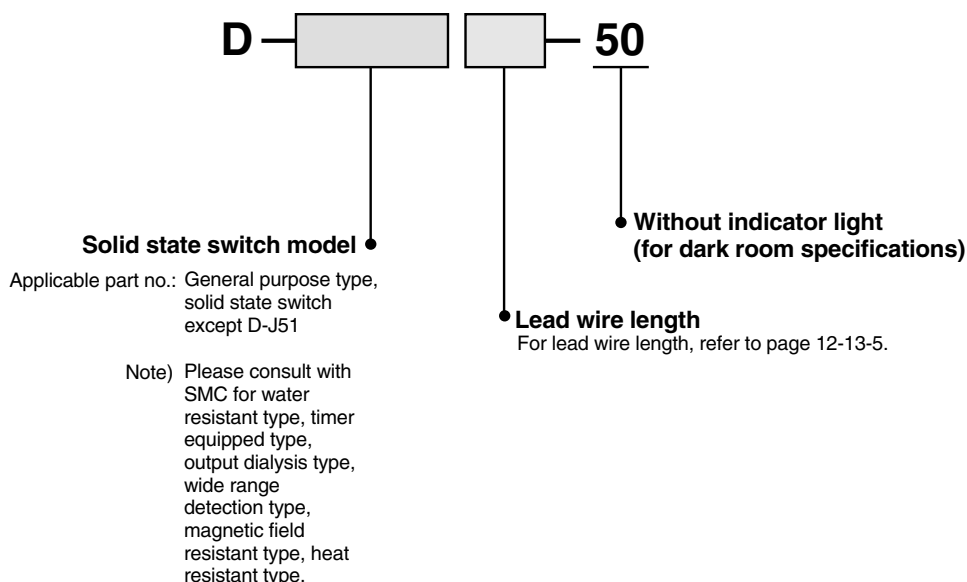
-61: Oil Resistant, Flexible Cable Specifications

2 Without Indicator Light (for dark room specifications)

Symbol

-50

Possible to use under the environment which hates a light.



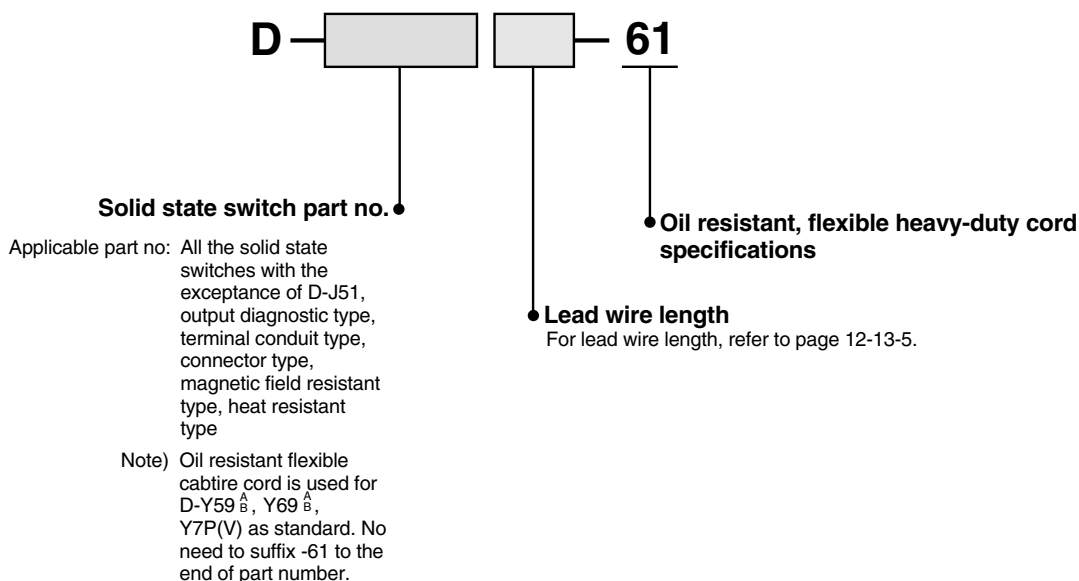
Dimensions and specifications are common as standard products with the exception of no indicator light.

3 Oil Resistant, Flexible Heavy-duty Cord Specifications

Symbol

-61

This is the product which uses a heavy-duty cord having flexible characteristics 5 times (SMC comparison) as strong as oil resistant heavy-duty cord used in the standard products.



Specifications are the same as standard products with the exception of lead wire specifications.

Lead wire: For D-F8, F9 type..... ø2.7, 0.15 mm², 3 cores (Brown, Blue, Black), 2 cores (Brown, Blue)

For other model nos..... ø3.4, 0.15 mm², 3 cores (Brown, Blue, Black), 2 cores (Brown, Blue)

Dimensions are identical with D-F5 type, G5 type, J59 type, K59 type. Lead wire diameter is changed from ø4 to ø3.4. In other series products, it is common as standard product's specifications.

MHZ

MHF

MHL

MHR

MHK

MHS

MHC

MHT

MHY

MHW

MRHQ

Misc.

D-

20-